

March 7, 2005

TO: Eugene Burke
FROM: N.Lacey/J. Retana
SUBJECT: 26M S-Band Refurbishment and 34M Near-Earth Ka-band
Implementation Downtime Assessment

The Resource Allocation Planning and Scheduling Office (RAPSO) was asked to determine the best placement for the proposed 26 Meter S-Band refurbishment and 34 Meter Near-Earth Ka-Band implementation at DSS-34 and DSS-54 in 2007 and 2008.

After the refurbishment the 26M subnet will have the Hydraulic Drives replaced with new Electric Drives, the Multi-Function Receiver's (MFR) will be replaced with new Block 5 Exciters and Receivers and the 2 kW and 20 kW transmitters will be replaced with new 200 watt solid state transmitters. DSS-34 and DSS-54 will have 26 GHz Ka-Band installed for Near-Earth downlink capability.

Summary

Based on the analysis RAPSO has performed the proposed downtimes will not impact the DSN ability to maintain nominal coverage to the projects requesting these stations. The contention that exists can be resolved during the Mid-Range Scheduling process.

Downtime Constraints

The 26M subnet refurbishments window is October 2006 through May 2008, three months each for DSS-16, DSS-46 and DSS-66. The 34M Near-Earth Ka-Band implementation window is April 2007 through August 2008, two months for DSS-34. One additional month has been proposed to complete the requested Near-Earth Ka-band implementation to the existing X/X Ka-Band installation downtime for DSS-54 in 2007.

Several constraints exist as to when any antenna can be off-line for long periods of time. The most severe constraint is DSN Level 1 Critical Events for each project/user. Additionally, some projects require continuous coverage during different phases of their mission such as support for launch and other activities requiring continuous coverage.

Assumptions:

Assumptions used to determine downtime recommendations are as follows:

- All events and support requirements are based on User Loading Profile (ULP) and Events agreed to at the February 2005 Resource Allocation Review Board.
- KEPLER Launch moved from October 2007 to June 2008

- DSS-27 will have NSP capability and be available to relieve 26M downtimes
- For new missions, the first day of the launch window is used as the nominal launch date.
- Maximum MSPA capability is assumed.
- Avoid multiple downtimes – if possible
- Downtime proposals should avoid adverse weather conditions in Canberra and Madrid by not planning downtimes during the harsh winter months for DSS-34 (June, July and August) and DSS-54 (December, January, and February)- if possible.
- Downtime proposals should avoid the Christmas and New Year’s holidays – if possible.

Methodology

To determine the best placement for the downtimes the following rational was used:

- DSS-16 activities were moved to DSS-24, DSS-27
- DSS-46 activities were moved to DSS-34
- DSS-66 activities were moved to DSS-54
- DSS-34 activities were moved to DSS-45 and DSS-46
- DSS-54 activities were moved to DSS-55, DSS-65 and DSS-66

Recommendations

Using the above constraints and assumptions as the basis of selecting possible windows for taking DSS-16, DSS-46, and DSS-66 down for S-band Refurbishment, three periods are recommended.

There are no Critical Events that would have an adverse effect with the 26M subnet and 34M Ka-band antennas downtimes as stated below:

26 Meter Subnet Proposals

DSS-16 Downtime Proposal for S-Band Refurbishment:

January 8, 2007 (Week 2) – April 1, 2007 (Week 13)

Key Events:

MUSC Re-entry	No 26M Requirement
MEX Occultation	No 26M Requirement
NHPC Jupiter Approach/Flyby/Departure	No 26M Requirement
ROSE Mars Swing-by	No 26M Requirement
SELE Launch - 02/01/07 (Potential)	DSS-46 Required for Launch Support

SOHO Keyhole

Keyholes are allocated on a 9 – 10
Week Cycle – No Solution

Forecasted Project Supportability Weeks 2 - 13 2007

	2	3	4	5	6	7	8	9	10	11	12	13
34B1	90%	88%	88%	86%	85%	90%	92%	87%	84%	90%	86%	81%
34HSB	90%	91%	90%	83%	91%	92%	92%	93%	93%	92%	92%	90%
26M	90%	90%	90%	95%	90%	90%	94%	90%	90%	90%	90%	91%

DSS-46 Downtime Proposal for S-Band Refurbishment:

January 7, 2008 (Week 2) – March 30, 2008 (Week 13)

Key Events:

MSGR Mercury Flyby #1 & DSM3

No 26M Requirement

NHPC Maneuver

No 26M Requirement

PHX Mars Approach

No 26M Requirement

SOHO Keyhole

Keyholes are allocated on a 9 – 10
Week Cycle – No Solution

Forecasted Project Supportability Weeks 2 - 13 2008

	2	3	4	5	6	7	8	9	10	11	12	13
34B1	89%	90%	92%	90%	91%	92%	94%	93%	88%	94%	90%	94%
34HSB	93%	93%	96%	94%	94%	94%	96%	94%	94%	94%	95%	95%
26M	81%	82%	65%	83%	83%	84%	68%	86%	86%	87%	70%	90%

DSS-66 Downtime Proposal for S-Band Refurbishment:

June 2, 2008 (Week 23) – August 24, 2008 (Week 34)

Key Events:

PHX Surface Ops

No 26M Requirement

ROSE Asteroid Flyby

No 26M Requirement

SOHO HSO continuous support

HSO may be adjusted to accommodate
downtime

SOHO Keyhole

Keyholes are allocated on a 9 – 10
Week Cycle – No Solution

Forecasted Project Supportability Weeks 23 - 34 2008

	23	24	25	26	27	28	29	30	31	32	33	34
34B1	93%	93%	90%	93%	93%	95%	96%	94%	96%	95%	91%	90%
34HSB	95%	95%	95%	95%	95%	95%	93%	93%	93%	93%	92%	93%
26M	81%	69%	81%	80%	81%	69%	77%	76%	77%	77%	76%	75%

34 Meter Near-Earth Ka-Band Implementation Proposal

Using the above mentioned constraints and assumptions as the basis of selecting possible windows, for taking DSS-34 and DSS-54 down for Near-Earth Ka-band implementation, two periods are recommended.

There are no DSN Level 1 Critical Events that would prohibit the DSS-34 and DSS-54 downtimes as stated below:

DSS-54 Downtime Proposal for Near-Earth Ka-Band Implementation:

April 23, 2007 (Week 17) – July 15, 2007 (Week 28)

Key Events:

MEX Occultation	DSS-14, 65
MUSC Re-entry	DSS-25, 34, 65
MUSC Re-entry TRIM	DSS-25, 34, <u>54</u>
MSGR Venus Approach/Flyby #2	34HEF
SOHO Keyhole	Keyholes are allocated on a 9 – 10 Week Cycle – No Solution
WMAP TCM	70M

Note: Per the RARB approved downtimes DSS-54 has already allocated time for X/X-Ka-band Installation in June - July of 2007. A single contiguous downtime appears to be the most efficient approach to performing the Ka-band Refurbishment.

Forecasted Project Supportability Weeks 17 - 28 2007

	17	18	19	20	21	22	23	24	25	26	27	28
34H	96%	96%	95%	93%	94%	95%	95%	95%	95%	96%	96%	96%
34B1	74%	78%	78%	74%	75%	76%	80%	84%	82%	84%	79%	83%
34B2	88%	85%	84%	87%	84%	84%	95%	93%	93%	91%	93%	93%
26M	88%	90%	91%	92%	92%	92%	92%	87%	93%	92%	91%	92%

DSS-34 Downtime Proposal for Near-Earth Ka-Band Implementation:

October 8, 2007 (Week 41) – December 2, 2007 (Week 48)

Key Events:

MSGR DSM2	70M
NHPC Checkout & TCMs	70M
ROSE Earth 2 Swing-by	DSS-24, 54
SOHO HSO Continuous Support	Minor Problem
SOHO Keyhole (2)	Keyholes are allocated on a 9 – 10 Week Cycle – No Solution

Forecasted Project Supportability Weeks 41 - 48 2007

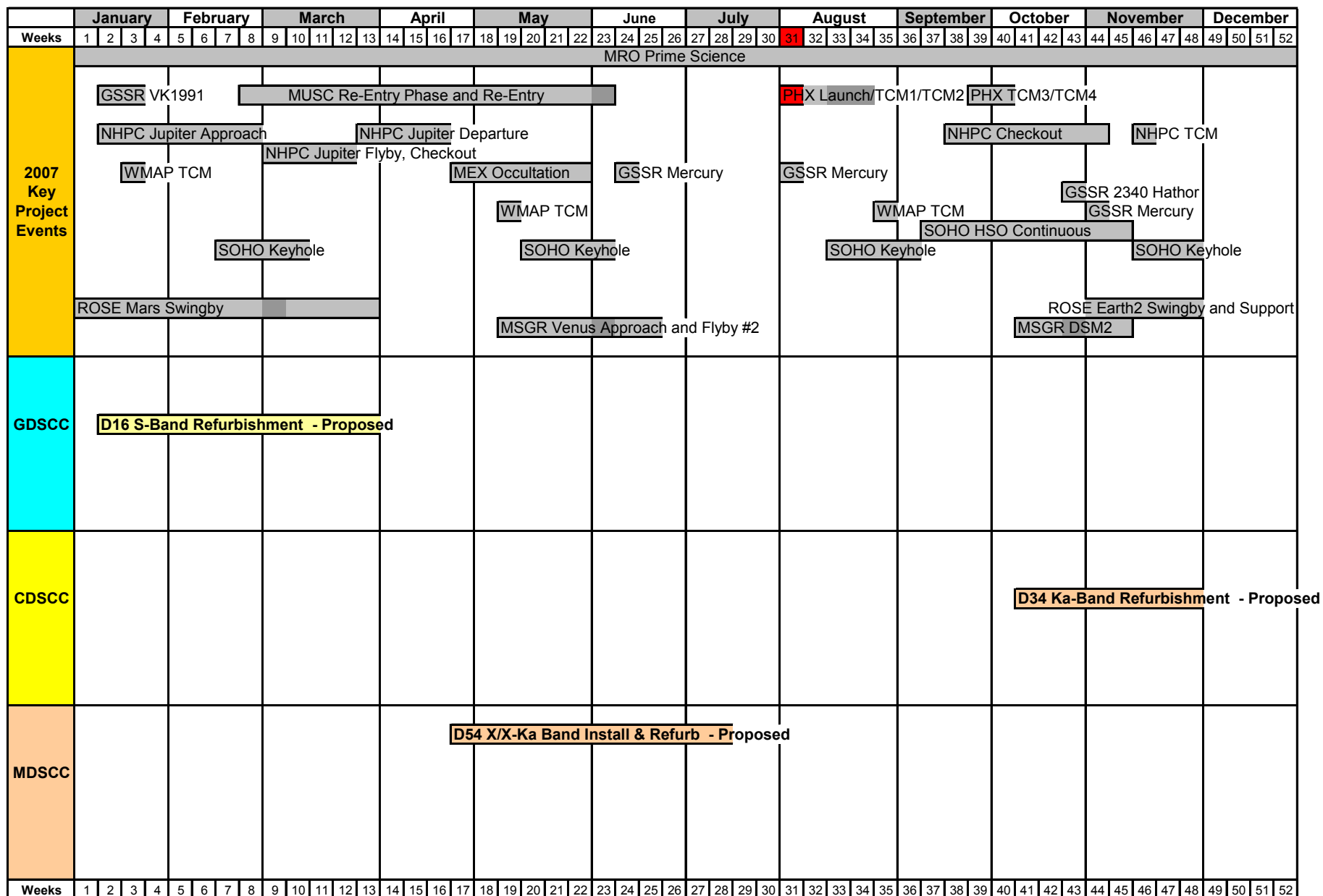
	41	42	43	44	45	46	47	48
34H	95%	94%	93%	91%	94%	96%	96%	97%
34B1	87%	86%	86%	87%	84%	83%	84%	79%
34B2	95%	95%	92%	97%	95%	93%	96%	95%
34HSB	91%	91%	91%	91%	91%	100%	99%	99%
26M	89%	88%	91%	89%	88%	90%	92%	92%

Conclusion

Based on the analysis RAPSO has performed the proposed downtimes will not impact the DSN ability to maintain nominal coverage to the projects requesting these stations. The contention that exists can be resolved during the Mid-Range Scheduling process.

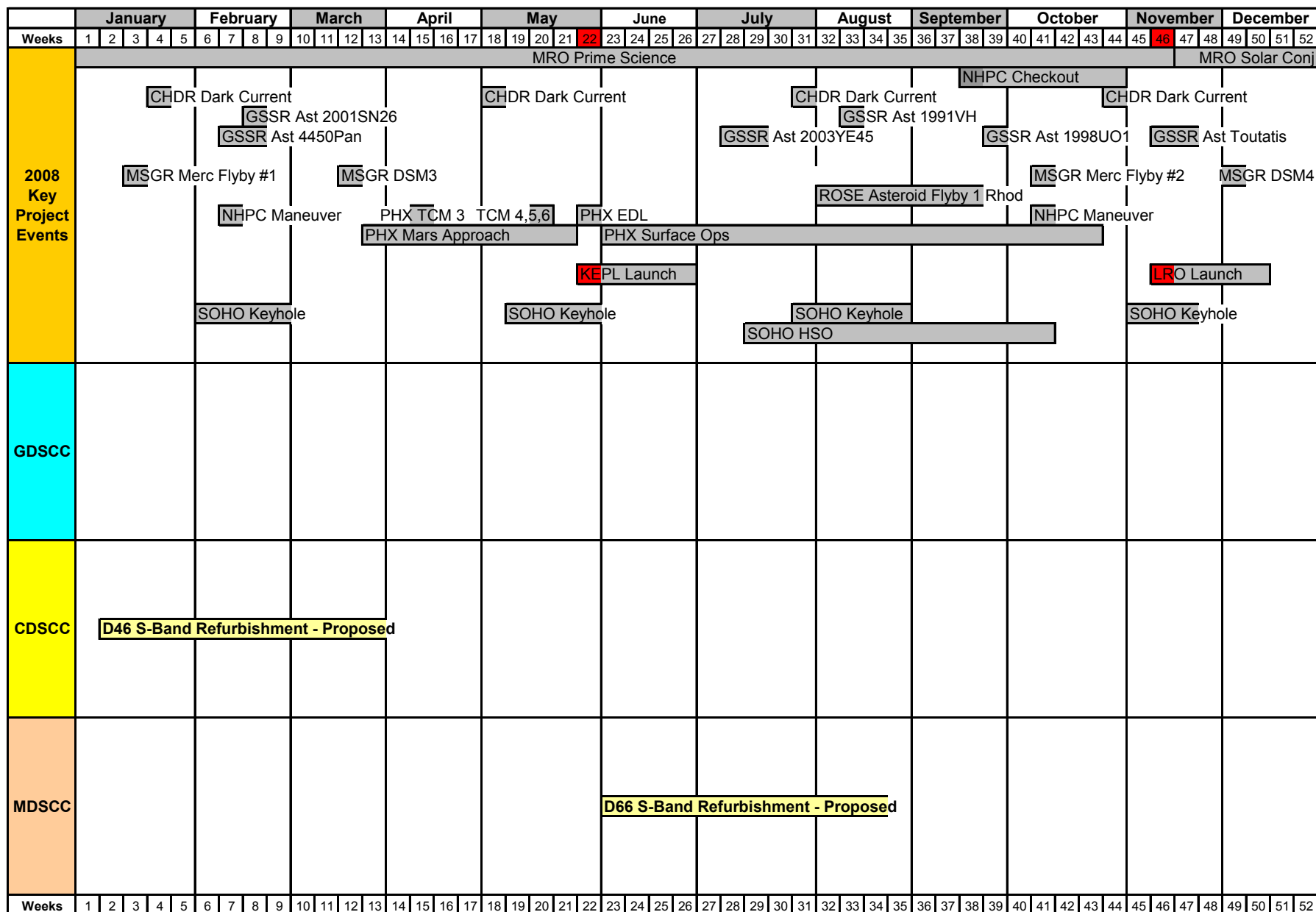
These downtimes are best illustrated on the proposed downtime charts below.

PROPOSED MAJOR DSN ANTENNA DOWNTIMES 2007



Revised: March 7, 2005

PROPOSED MAJOR DSN ANTENNA DOWNTIMES 2008



Revised: March 7, 2005